



## CONSULTING ASSISTANCE ON ECONOMIC REFORM II

### REPORTS

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#### **A Macroeconomic Framework for Analyzing the Angolan Economy**

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## **A Macroeconomic Framework for Analyzing the Angolan Economy**

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**October 2000**

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### **Abstract**

The paper presents a simple macroeconomic framework for analyzing the future growth of the Angolan economy. Based on a version of the World Bank's Revised Minimum Standard Model previously developed in the Angolan Ministry of Planning , this model is capable of analyzing the different possible uses of oil revenue in the economy and their different implications for the future growth and structure of the economy.

# **A Macroeconomic Framework for Analyzing the Angolan Economy**

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## **I. Introduction**

Over the past year the Angolan government has made major strides in stabilizing its economy and starting to lay the foundation for long term growth. While fiscal deficits continue and the resulting inflation remains high, the government has unified the exchange rate and has reached an understanding with the IMF. The Staff Monitored Program agreed on will, if fully implemented, complete and consolidate the stabilization efforts of the past year. The World Bank has resumed assistance to the Angola as of last July, another sign that the level of confidence needed to support economic growth may be close at hand.

In spite of these positive omens, there remain various problem areas, the chief of which is continued money financed fiscal deficits. Inflation has reached annualized levels of between 300 and 400% according to the latest available figures, indicating that the possibility of yet another hyperinflationary spiral cannot be ignored. Nevertheless, the government has committed itself to fiscal control and transparency which, if achieved, would go far toward remedying the root cause of this problem.

Another area that remains problematical is that Angola's economic performance, as has been the case since independence, continues to be dominated by two overriding factors: the ongoing war between the government and the forces of UNITA, and the huge inflows of oil revenue that are still on a sharp upward trend. While it is difficult to make economic projections in a wartime situation, the government has succeeded in pushing UNITA out of many of its historical base areas, though guerrilla activity continues across many parts of the country. Thus, war expenditures, though they may continue

for the foreseeable future, may be capable of being more contained than they were during major crisis periods in the past.

Oil exploration continues to uncover vast reserves of oil, with new proven reserves far outstripping current production. While there is no real way to know the ultimate size of Angola's reserves there is substantial value to illuminating the tradeoffs involved in the uses of the oil money. This is something that has a profound effect on the economy even under war conditions, but which will become increasingly difficult to manage and far more prominent as the levels of production increase. The manner in which oil revenue is disposed of will remain the single most important determinant of economic performance for the foreseeable future.

This fact inspired the modeling effort outlined in this paper. The sections below outline a simple consistency model of the Angolan economy based on the modeling framework used in the World Bank's Revised Minimum Standard Model (RMSM). This framework was first developed in Angola for a short run model focused on monetary and financial sectors by a team in the Ministry of Planning led by Mr. Pedro Luis and Dr. Alves da Rocha. This model was extended to a longer term horizon (2025) and disaggregated sectorally to allow examination of the relative growth of oil, manufacturing and agriculture over the long term.

This paper does not attempt to present actual policy scenarios using the model, being confined to a presentation of the structure of the model together with an analysis of the Angolan economy which motivates it. At the present time, the oil economy continues to boom while other sectors continue to stagnate, and strategies to promote more widespread growth are key to a viable and stable future for the Angolan economy.

The economy has remained far below levels achieved prior to independence with the exception of the oil sector, which has provided a huge foreign exchange windfall to the government amounting to

about \$2 billion/year. With the renewal of hostilities in late 1998 non-oil sectors have contracted once more while oil continues to grow. Periodic bouts of hyperinflation have contributed to the retreat of many from the money economy, particularly in rural areas, where many peasants have reverted to subsistence production and barter, and while others resettled on lands they fled during the worst of the conflict, many were forced to flee once more when fighting resumed. Many others remain in periurban areas, living on the fringes of the formal economy. While the military success of the government in the past year has created conditions under which many rural inhabitants can return to their land, rural areas remain underpopulated and isolated from major markets and population centers.

The huge and growing amounts of oil revenue (amounting to more than half of GDP) have caused distortions typical of oil exporting economies, and commonly known as "Dutch Disease". This refers to the problems of exchange rate overvaluation and relative price distortions that result in strong urban bias and stagnation of non-oil exports and import competing sectors. Diamonds constitute an additional factor exacerbating the already strong effects from oil. The activities most adversely affected are those most exposed to competition from abroad, in this case, agriculture and light manufacturing and agro-processing sectors which have been virtually 100% replaced by imports in the large urban markets on the coast. Prior to independence Angola was the world's fourth largest coffee exporter and also exported more than 400,000 MT of maize a year. Exports of both of these crops are now near zero, while industrial production is at such a low level as to be almost negligible.

The unification of the parallel and official exchange rates over the past year and a half has done much to alleviate some of the worst problems associated with the overvalued official rate of the past. The parallel and official rates have been kept within about 10% of each other since their unification in May of 1998. This has eliminated a longstanding source of problems in that only a privileged few had access to foreign exchange at the artificially cheap official rate while the incentive to evade the official financial system on the part of exporters was very strong. Nevertheless, the exchange rate has continued to depreciate due to continuing high inflation, projected by some to total an annual rate of

250% by the end of 1999. During 2000 this rate has grown to almost 400% and while this is still short of hyperinflationary levels, the danger of another inflationary spiral remains until such time as the government implements the relevant fiscal and financial measures included in the IMF Staff Monitored Program.

The pervasive effects of Dutch Disease are perhaps stronger in Angola than in any other oil exporting country due not only to the huge share of GDP accounted for by oil, but also because the enclave nature of oil production is especially pronounced in Angola, where oil literally never touches the territory of the country apart from the Province of Cabinda which is separated from the bulk of the country by Congo. Offshore production is increasing with additional exploration continuing in order to expand output substantially over the next few years.

The central government is virtually completely dependent on oil receipts which are used primarily to service foreign debt and to support the government budget. Expenditures are devoted mainly to defense, debt service and maintenance of the central government apparatus in Luanda. The resulting boom in spending has resulted in a highly inflationary economy in Luanda in which most of the traditional links to productive areas in the interior have been broken. In effect, Angola has had two economies, one reliant on imports at the official exchange rate financed by oil receipts, while the bulk of the population lives in an economy operating at parallel market prices, divorced from the official economy. The unification of the exchange rates over the past year and a half has eliminated the access of the privileged few to artificially cheap foreign exchange, but has not eliminated the vast economic gulf between the elite which lives on oil money channeled through the government, and the masses of Angolans who live in abject poverty.

The major source of inflationary pressure has continued to be the fiscal deficit of the government as expenditures have outpaced oil revenues, due both to large military expenditures necessitated by the war and by the military expeditions sent to support factions in the conflicts in the two Congos, and the

need to make payments on the external debt, which stood at approximately \$12 billion by the end of 1999. At present, much of the income from oil production is devoted to debt service, though the new fields scheduled to enter into production in the near future should help somewhat to ameliorate this situation as has receipt of large signing bonuses for oil contracts this year. This will avoid a crisis in the near term by allowing financing gaps to be covered, but will merely postpone the inevitable adjustment to a later date at which time the gaps will be larger, the imbalances more severe, and the debt larger.

The government has undergone several cycles of reform and renewed inflation over the years since the collapse of the 1992 peace agreement. It first enunciated a reform program in July 1995 designed to stabilize prices and achieve external balance, recognizing that the severe imbalances and distortions afflicting the economy were serious impediments to development and growth. In support of this program, the Government entered into discussions with the IMF in order to start the process leading eventually to a Fund approved ESAF together with structural adjustment lending by the World Bank. Unfortunately, it has proven more difficult than anticipated to adhere to the targets set by the Government in the Round Table document, and subsequent discussions with the Fund proved unsuccessful. The failure of the stabilization program initiated in 1996, and the ensuing reemergence of the inflationary spiral of the preceding period underscored the need for a serious stabilization program. The program that was implemented in 1997 and 1998 succeeded in containing inflation for some months at a time, but gradually eroded as control measures have been unable to contain inflationary pressures. Failure to devalue the currency in line with rising prices resulted in parallel market spreads over the official exchange rate of more than 70%. The latest reform effort has (as noted above) succeeded in unifying the exchange rate but has not succeeded in stabilizing the fiscal situation. The result has been continued inflation.

As in the past, it is clear at the present time that the primary cause of the instability is the continuing deficit of the central government. The absence of unified budgeting and accounting procedures make it difficult to accurately assess the true size of the fiscal deficit, but it was



approximately 24% of GDP in 1995, and continued to remain highly in deficit last year in 1996 and then again in 1997, when the deficit amounted to about 20% of GDP. The deficit was reduced to only 13.1% of GDP in 1999 and the goal for 2000 is to move to a surplus of 1.8% of GDP. If attained, this would be the first balanced budget in Angola in many years.

## **II. Liberalization and Reform**

Many of Angola's economic difficulties in the present are the result of longstanding problems. An understanding of these can help provide the basis for an understanding of the options for improvement in the future.

### **A. The History of Control and Government Domination**

Upon independence, Angola suffered from an extreme lack of skilled labor, particularly citizens with experience in administration and policy making. This problem was far more extreme in ex-Portuguese colonies than in others, due to the virtually complete domination of all formal sector jobs by Portuguese, even down to the level of street vendors and taxi drivers. At independence, the sudden departure of nearly all of these colonists left the country, leaving it in a state of near paralysis.

At the time, the government felt it had little choice but to take over the abandoned farms, factories, etc. in order to prevent their complete decay and ruin. Given the MPLA's reliance on the former Soviet bloc for support and advice, the strong tendency toward a command and control style of management is understandable. Indeed, given the previous lack of any managerial experience due to the Portuguese domination of the economy, the only experience most Angolans have with government administration and management is that gained under the tutelage of the Russians and their allies. This was reinforced both by the education of many Angolans in communist countries and by the presence of

Cuban troops and advisers for more than a decade after independence. (The Cubans were originally asked to assist in repelling an invasion by the South African army.)

Accordingly, the effort to liberalize has been slow, given the inability of many government functionaries to visualize or understand how a market economy operates and what the relative roles of the state and private sectors are in such a system. The problem has been exacerbated by the rampant large scale corruption that has accompanied the exploitation of Angola's large oil reserves. Government control of these receipts together with the rents available from exploitation of the distortions resulting from economic controls have sustained a high standard of living for those fortunate enough to have access. Even for those without direct access, corruption has become for many a survival mechanism, given salaries with real values less than 20 dollars/month.

Over the past six years, there have been annual attempts at liberalization, which have ended with a resurgence of inflation and reimposition of controls (though in this most recent cycle controls have so far been avoided in spite of renewed inflation). Liberalization together with monetization of fiscal deficits the size of Angola's are a clear recipe for hyperinflation, and while reimposition of controls can convert open inflation into repressed inflation, the real need for control lies in the area of the government budget, where it is essential that expenditures be confined to levels that can be financed without recourse to money creation.

## B. Pricing and Distribution

Under the command and control regime of the mid 1970's until the late 1980's pricing and distribution were done on a Soviet model, with fixed prices serving merely as accounting devices for the planned distribution of goods and service. While prices have been gradual decontrolled for most items, there has been substantial resistance to decontrol of wholesale and retail margins. While these controls

were lifted on some items over the various liberalization attempts, they have now been reimposed universally.

There is a strong perception in the government that speculators are the cause of inflation and depreciation of the exchange rate. While this logic is not supportable economically, it seems clear that the only real solution to rampant speculation is to achieve macroeconomic stability, since the ability of speculators and others to operate outside of controls in the black market is unlikely to be significantly affected by government efforts at repression. Complementing controls on prices and margins are a myriad of licensing requirements for many different economic activities. Any agent engaging in trade of any kind must first obtain a license, a lengthy project usually subject to additional costs due to the need for payments to the officials involved.

### **III. Political Economy of Reform**

Ultimately, the most difficult obstacles to reform are political. The current system provides large benefits to some in the country and the unwillingness of these groups to lose their privileged positions has blocked past reform attempts. Any successful reform effort must be not only economically feasible and sustainable, but it must also allow for the political realities of the current Angolan situation.

#### **A. The Failure of the Lusaka Accords and the National Unity Government**

The Lusaka Accords were rightly hailed by all observers as a plan for peace and national reconciliation with a real potential for success. Indeed, after their adoption there was a period of relative peace, and the process of demobilization proceeded (though slower than planned) until the end of 1998, when hostilities resumed. It is now clear that the Lusaka Accords are a dead letter, and the government has had a great deal of success in pushing for a military solution. It is nevertheless unclear

whether this approach can ever result in the elimination of UNITA; in spite of government successes on the battlefield, some observers hope for an eventual return to a search for a negotiated settlement. To date, however, the government has refused to negotiate with Savimbi, maintaining that his repeated lack of good faith in past makes it impossible to rely on any agreement reached with him. The obvious rationale for this position has led most foreign governments to support this stance, but the hope that the current relatively low level conflict can be ended any time soon must be regarded as unlikely.

#### B. Rents, Elites and the Incentive to Reform

It is perhaps a truism that in order for reform to be pursued, it must be perceived to be in the best interests of those who must make the decision to do it. In the case of Angola there are particularly high obstacles to achieving this perception, stemming from the current structure of oil-derived foreign exchange inflows and the distortions they induce.

First and foremost is the fact that the oil rents are controlled by the central government and allocated as dictated by those in charge of it. What this has meant in the past is that the political elite of the MPLA and of UNITA have been insulated from the economic problems afflicting the rest of the population due to their ability to control foreign exchange receipts and purchase needed consumption items from abroad. While most of the population has been suffering from the collapse of domestic production and rampant hyperinflation, those in a position of privilege have had preferential access to foreign markets in order to avoid these problems, creating an artificial economy in Luanda which is almost entirely divorced from the rest of the country.

Not only was foreign exchange allocated on a formulaic, preferential basis, but there was also a huge problem of preferential exchange rates as well. Government purchases were made in many instances at an official exchange rate which has been extremely overvalued, providing those with access the opportunity for quick profits on an enormous scale by purchasing goods at official exchange rates and reselling them at parallel market prices

Since the unification of the exchange rate in May of 1999 preferential exchange arrangements have been eliminated as a source of rents for those in a privileged position. However, rents continue to be extracted via government expenditures as well as various arrangements surrounding oil concessions and negotiations.

What this means is that those currently benefitting from the present situation will not be better off in the short run after implementation of a reform program which eliminates these preferences and distortions. It is simply not accurate, and certainly not persuasive, to attempt to make the case for reform on the basis of a supposed improvement in the situation for the political elite because it will not happen. Rather, a case for reform must rest on the fact that the problems afflicting the Angolan economy are well known, and the trajectory of the economy, and that of the elites who benefit from the current situation will inevitably result in a less favorable situation in the long run if reforms are avoided in the short run. In addition, there are real questions as to whether political and social stability can be maintained if the situation for the general public continues to deteriorate.

If continued and expanded reforms are avoided now, there will be another period of prosperity for those with preferential access to oil receipts as the new production areas come on line. However, this strategy merely perpetuates the pattern of mortgaging oil production to pay off debt, a pattern which can only continue as long as oil production growth continues to outpace the growth of foreign debt and the cost of servicing it. This point is extremely important; foreign debt, if it is never paid down (as has been the case to date) never stops growing. Oil production growth does. While the outlook in 1999 may appear favorable due to the opening of new production fields, there is no reason to believe that current growth rates in output can be maintained forever. If, in fact, oil production growth cannot be maintained forever, then the day will inevitably come when oil output must once again be dedicated in its

entirety to service foreign debt, as would have been the case in a very few years if the new oil fields had not been discovered.

Angola is not a unique case. Exactly the same problem has plagued other oil exporting countries as they have struggled to cope with the consequences of huge oil financed inflows of foreign exchange. Nigeria is perhaps the closest parallel case, given the fact that it, too, was a relatively low income sub Saharan African country which produced large agricultural surpluses for export and which also suffered a destructive civil war. Nigeria also ran up huge foreign debts in the process of fighting the civil war and pumping out its oil windfall, and like Angola, suffered from massive overvaluation, inflation, and distortion of the domestic economy. The lesson is clear: Those elites which profited from the situation in the short run are worse off now than they would be had they been able to pursue reforms early in the process.

It is useful to emphasize that every single country which has enjoyed an oil windfall has suffered from these problems to some degree. Angola is in fact a more extreme case due to the higher degree of oil dependence as compared to other countries. Even Saudi Arabia, where oil discoveries were so huge relative to the economy and the population that it seemed that they were inexhaustible, is now facing the fact that oil production growth cannot remain higher than expenditure growth forever, and that even in this case, adjustments are needed at some point. The key is that it is clear that adjustments taken early are far less painful and have far greater potential to result in a greater level of welfare in general than would be the case if they are delayed.

One fortunate aspect of the political economy of reform is that there are very few adverse implications for poverty or other social dimensions. The benefits from the current situation are concentrated in a relatively few hands, so removal of them will not affect the vast majority of the population in the short term. In effect, they are already living at parallel market prices and so liberalization will not make their situation any worse than it already is. In the long run, an adjustment and

liberalization program has substantial potential to improve the situation of these segments of society, as they can take advantage of growth in such trade exposed sectors as agriculture.

### C. Macro Strategy and Political Economy in the Long Run

Over the long run, there are two important areas of potential problems in achieving a national consensus on a macro strategy for growth and development. The first is the issue of mineral rents from oil, diamonds and other sources, and the decision as to how and when to spend the income. The second is the difference in economic interests between agricultural regions and urban populations. This last is a common area of debate in many countries both low income and high income (see, for example, the extensive studies summarized in Krueger, Schiff and Valdes), and one which in the Angolan case, is both exacerbated by the nature of the political groupings that currently exist, and closely related to the manner in which the first problem - that of mineral rents - is eventually resolved.

As noted above, Angola possesses oil and mineral wealth in abundance, and currently relies on that income to a far greater degree than is the case in any other country in the world outside of the Persian Gulf. According to the most recent figures, as much as 50% of national income derives from oil alone, and this figure can be expected to remain high even if the non-oil economy is successfully rehabilitated due to the discovery of what are reported to be huge new fields in off-shore areas. At the most general level, there are two main issues involved with this income:

1. How fast to exploit the various mineral resources.
2. How to spend the money.

## **How Fast to Exploit the Oil**

With regard to the first issue, there is an extensive literature on the dangers of excessively rapid exploitation of oil reserves and expenditure of the funds in ways that do not contribute to long run growth and welfare. In particular, Gelb et. al. have shown in numerous case studies, including several directly relevant to the Angolan case, that the distortions which result from large expenditures in the near term can in the end leave a country worse off than it was in the beginning. Given Angola's markedly greater dependence on these revenues than any of the countries whose experience forms the basis for these observations, there is reason for caution.

Essentially, the issue is this: Large inflows of foreign exchange have the potential to generate highly undesirable effects on the domestic structure of production and consumption due to the short run incentives to capture the large rents available. However, distortions in the domestic economy can be avoided if the foreign exchange bonanza is spent on imports rather than domestically produced goods and services. In the Angolan case, this is what has for the most part been occurring to date on both the input side of oil production and on the expenditure side once receipts have been received. Even so, a substantial amount of the demand created by the oil windfall has fallen on non-traded goods, particularly in urban areas, where services and housing account for a large share of expenditures by the rich.

On the production side, the offshore nature of Angolan production today, and the original location of much of the production in the physically separate province of Cabinda, have reinforced the oil companies' historical inclination to extract the oil with 100% imported technology operated virtually 100% by expatriate workers, who live in contained facilities with virtually no linkages with the domestic economy. Accordingly, there are no significant effects in terms of 'resource pull' from the rest of the Angolan economy since the oil sector makes almost no use of any domestic capital, labor, or even



consumption items for its work force. It is likely that this situation will persist in the future given the fact that Angola continues to contract extraction out to various foreign oil companies which operate their concessions as enclaves. In the case of diamonds, the sector is not physically isolated as is the case for oil (diamonds are located primarily in the northeastern provinces) but the production process provides little opportunity for significant backward linkages to the rest of the economy.

On the expenditure side, all of the oil money has accrued to the central government apparatus, which has spent by far the largest part of its income on imports. During the height of the civil conflict this was largely unavoidable, as large purchases of weapons were needed. In terms of consumption items, the physical barriers to trade between the large coastal urban centers and the rest of the country made it extremely difficult for any of the expenditures to translate into demand for domestic products. Everything from food to consumer durables has been imported.

While there is some apparent tendency toward the "normal" Dutch Disease pattern of high levels of expenditures on labor services, this is not primarily a product of bloated government wage bills as is the case in some other countries. Though the government labor force is clearly larger than warranted, the vast majority of these functionaries are so underpaid that salaries in fact constitute a relatively small share of the government budget compared to other countries at a comparable level of income. (See above). Insofar as there are greater expenditures on services in urban centers such as Luanda, this has occurred via the personal consumption decisions of those segments of society benefitting from the bulk of the oil revenue. In addition, it is also important to bear in mind the large military establishments maintained by both sides in the civil conflicts of the past years.

What this means in terms of the internal and external balance of the Angolan economy is that the balance of payments has remained severely in deficit while pressures on the real exchange rate have been far less than would be the case if some of the oil funded demand had fallen on domestic production. Even so, it is clear even to a casual empirical observer of the urban economy in Luanda and other cities, that prices are quite high by international standards. Even at black market exchange

rates, Luanda is a very expensive city, comparable to large cities in Europe and North America, which is a testament to the high levels of demand resulting from mineral income.

So, if one of the basic problems is the inability of the economy to absorb the large sums of money spent in the short run without detrimental distortions, then one possible solution would be to save some of the money offshore, or to simply pump the oil out at a slower rate. The first option is one that has not been achieved with any great degree of success by any oil exporting country to date. There are simply too many pressures on the government officials both personally and in their official capacities to spend the money when it becomes available. Even so, the government can achieve much the same effect by using revenues to pay off past foreign debt to the extent possible. So far, this has not occurred, both because of political issues surrounding debt repayment and because the government has in fact been dedicating future oil production to servicing current debt obligations to such an extent that most of the revenue has gone to this end.

This is an important reason why the present situation offers some opportunities which have not been possible in the past. Given the large new oil fields coming on line now and in the near future, there is a window of opportunity for the government to use the additional windfall to make the adjustments needed to get out of the vicious circle of mortgaging increasing amounts of current production to future debt service. The alternative is to spend the money now and continue the pattern of the past, but at a higher level of debt.

### **How to Spend the Mineral Revenues**

The basic problem of oil economies, that of a highly overvalued exchange rate, has the effect of imposing high implicit costs on those sectors most exposed to international trade, either because they produce export products, or because they face actual or potential import competition. Accordingly, the factors of production employed in these sectors suffer, and to the extent they are able, migrate toward

uses in which they can earn greater rewards, in this case the urban centers where oil money is received and spent.

In the Angolan case, it is clear that the hardest hit sector is agriculture, together with associated processing and transforming industries. Angola has historically demonstrated a strong comparative advantage in agriculture (see above) and this sector provides employment and income for the majority of the population. Therefore, from a the point of view of both poverty and equity, there is a powerful case to be made to avoid overvaluation to the extent possible to avoid penalizing this sector.

Even if exchange rate overvaluation persists to some degree, the strong underlying comparative advantage in agriculture suggests a government investment strategy directed toward provision of infrastructure and public goods which can help lower costs of production in this sector. Obvious candidates are rehabilitation of the country's transportation system, including roads, ports and railroads, as well as investments in agricultural research and extension. All of this is, of course, predicated on a successful continuation of the peace process and resettlement of rural populations in producing areas. In addition, lack of public services such as water and sanitation, as well as electricity and other utilities are a serious constraint to industrial investment and rehabilitation. Investment in human capital, especially primary education, is another area where high long term returns can be gained.

It is precisely in the area of how and where to spend the oil revenues that political considerations tend to be important in any country, and particularly so in Angola. The political divide that has led the country to the present state of devastation pits the largely urban and coastal base of the MPLA against the largely rural and agricultural base of the UNITA forces which have their core of support in the agricultural breadbasket of the central highlands. This means that issues of urban-rural balance and investment in agriculture vis a vis other sectors are immediately and automatically a bone of contention between the two sides in this long running political and military conflict.

While it is unclear to what extent either side is prepared to embark on a program of adjustment and investment designed to protect and promote non-mineral traded sectors, it is clear that even if there were no mineral revenue at all, there would remain a natural tension between urban and agricultural interests. This arises naturally from the fact that what the one sector produces - food and fiber - the other consumes, thus creating natural constituencies for both overvaluing and undervaluing the national currency. This natural tension, seen in currently developed countries at various points in their history can, if tipped too far to one side, result in strangulation and stagnation of parts of the economy. The Angolan problem is exacerbated by the extreme urban bias created by the concentration of oil money in the capital.

In summary, the experience of other oil countries, and the theoretical literature on Dutch Disease effects, show that the distortions induced, particularly via the exchange rate, create very adverse conditions for other sectors. As noted above, in the Angolan case agriculture is the most important of these, both in terms of its share of the labor force and due to the well demonstrated comparative advantage enjoyed by the country. There are also a wide range of light manufacturing activities which would be rapidly developed by the private sector given appropriate conditions. Accordingly, some clear long term policy prescriptions emerge from this analysis:

1. Maintenance of an appropriately valued exchange rate is paramount. As noted above, the government has achieved this.
2. Free access to foreign exchange and ease of international trade (i.e. elimination of bureaucratic barriers. While access to foreign exchange is now relatively liberalized, bureaucratic barriers remain a major problem.
3. A program of investment in public goods necessary to the agricultural sector and rehabilitation of manufacturing. This has yet to materialize.

4. A program of investment in human capital via rebuilding of schools and basic social services. This, too has yet to materialize.

All of these conditions are important to maintain incentives for foreign investment, which will itself help speed the process of rehabilitation of the economy and achieving a sustained growth in non-oil output. However, the most important factor, indeed a prerequisite, for reactivating foreign investment even given the most liberal law possible, is the level of confidence in the government and the credibility of its policies in terms of maintaining a stable and favorable environment for business.

The stop-go reform and retreats of the past years have not helped create a feeling of confidence - some degree of constancy is imperative if the government is to hope to attract any substantial investment outside of the oil and diamond sectors. At this point, the single most important indicator which will result in the confidence foreign investors require before putting money in the country is, rightly or wrongly, approval of the IMF and the World Bank of the government's policy package. While the government may not in fact need the approval of these organizations to succeed in developing Angola, it is a fact of life at the present time that many potential foreign investors look to them for indications that a country is safe to invest in. Accordingly, it would be desirable to attempt to achieve a policy package which can satisfy basic requirements of these organizations without sacrificing the legitimate goals and aspirations of the Angolan government and people.

Finally, it needs to be recognized that all of the discussion about Angola's future depends on the assumption that peace can be achieved and that a process of political reconciliation can be effectively pursued. Without this, and without a continuation of the mine clearance and resettlement which began after the signing of the Lusaka Accords, there is little basis for any progress.

#### **IV. A Macroeconomic Model for Angola**

A simple framework for analyzing the considerations laid out above was built on short run modeling efforts already undertaken by the Angolan government. The state of data availability in Angola limits the level of detail which can be achieved, but it is nevertheless possible to model the broad outlines of policies with respect to government revenues, investments and growth.

The equations of the macroeconomic model are listed in Appendix A and Appendix B contains a complete printout of the current version of the model. As can be seen, the model provides a four-way sectoral disaggregation of the real economy (oil, agriculture, manufacturing, other) as well as substantial detail in the monetary, financial and international sectors. This will allow an examination of the relative trajectories of the growth rates of the real economy under different scenarios.

One of the extensions that was made to the original version of the model is that the growth rate of the agricultural sector can be made dependent upon the real exchange rate. In the version specified here, the operative price ratio is the relative price of agricultural exports as compared to the consumer price index in the economy, though this can be changed to examine different hypotheses regarding the best representation of the real exchange rate in the Angolan economy. In preliminary experiments using this formulation, it was shown that a wide variety of responses can be modeled and that the sensitivity of the agricultural sector growth rate with respect to the relative price of agricultural output can have a powerful effect upon the overall economy. This is particularly important from the point of view of poverty alleviation, given the large portion of the population earning their income from agriculture. Agriculture is also the most promising avenue for diversification of exports beyond the current near total dependence on oil.

Indeed, it is this mechanism which is perhaps the most important aspect of the macroeconomic

distortions caused by oil dependence. A preliminary test run of the model showed that at an elasticity of 1.5, agricultural value added at the end of the modeling period varied by a substantial margin. Indeed, if agricultural prices rise gradually over the twenty five year period at an annual rate of about 5%, total agricultural value added at the end of the period is more than twice as large as it would be with stagnant relative prices for agriculture. The increase in per capita income that this represents would do more to alleviate poverty in Angola than any other feasible policy.

Though this scenario is based on assumed values for the relevant variables, it points out the importance of these relationships for the future evolution of the economy. While small changes may not appear to make a large difference in the short run, they can over a longer period add up to an economic structure which is substantially different from that which we see today. As noted below, development of realistic scenarios of the future will require recalibration of the model based on the new economic situation in the country.

One important aspect of this scenario is the fact that the main agricultural producing regions of Angola are, as noted above, also the regions where UNITA has been most strongly supported. Government policies which promote growth and improved welfare in these areas can probably do more over the long run to overcome historical antagonisms than can a purely military approach.

### **Directions for Future Extension**

Future modifications of the model could include some of the following possibilities:

- Linkage of investment levels to growth in the various sectors. At the present time, sectoral growth rates are exogenous with the exception of agriculture. In the case of agriculture, growth depends on some version of the real exchange rate. These relationships could be modified to depend upon the sectoral pattern of investment as well as relative prices.
- Further sectoral disaggregation. At the present time, the sectoral disaggregation has been kept rather simple in order to highlight long run trends and tradeoffs. However, it would be possible to disaggregate further, particularly if this model could be linked with an input-output or social accounting matrix approach.
- Regional disaggregation. Allowing the model to portray urban vs. rural areas can help illuminate some



of the typical effects of Dutch Disease.

## **Next Steps**

While the model presented here can be quite useful in analyzing the major choices confronting the Angolan government, it is but a very small step toward production of long run scenarios of the Angolan economy. Recent economic developments make it necessary to reconsider the basic data and starting points for the model, especially in two areas: First, the continuing discoveries of new oil reserves will necessitate a reconsideration of the likely stream of revenues from this source in the future. Second, the renewal of war at the end of 1998 has had profound economic ramifications due to the widespread disruption of activities, destruction of infrastructure, and forced relocation of millions of citizens. While the war has been successfully concluded in many areas, it has delayed the government's reform and stabilization efforts, making a new calculation of base year values an important prerequisite for future modeling efforts.

## Appendix A

### Equations for Angola Macro Model

#### I. SUPPLY SIDE (Billions of 1987 Kwanzas)

EQ1A $VBPP=BD*365*516000/10^{12}$ ;	GROSS PRODUCTION OF PETROLEUM
EQ1B $YP87=0.74*VBPP$ ;	VALUE ADDED OF PETROLEUM SECTOR
EQ2 $YR87=YR87(-1)*(1+TVYR/100)$ ;	VALUE ADDED OTHER SECTORS
EQ2A $YAG87=YAG87(-1)*(1+TVYAG/100)$ ;	VALUE ADDED - AGRICULTURE
EQ2c $TVYAG=(PEXAG/PC)^{ELAST}$ ;	ELASTICITY OF AG GROWTH WITH RESPECT TO THE REAL EXCHANGE RATE
EQ2B $YMAN87=YMAN87(-1)*(1+TVYMAN/100)$ ;	VALUE ADDED - MANUFACTURING
EQ3 $YCF87=YP87+YR87+YAG87+YMAN87$ ;	GDP AT FACTOR COST
EQ4 $TIL87=TILY87*YCF87$ ;	INDIRECT TAXES AND SUBSIDIES
EQ5 $Y87=YCF87+TIL87$ ;	GDP AT MARKET PRICES
EQ5A $YPOT87=Y87/TUC$ ;	POTENTIAL GDP
EQ6 $POP=POP(-1)*(1+TVPOP/100)$ ;	POPULATION
EQ7 $Y87PC=Y87/POP*1000$ ;	GDP PER CAPITA
EQ7A $TVY=(Y87/Y87(-1)-1)*100$ ;	GROWTH OF GDP

#### II. FINAL DEMAND (at 1987 prices)

EQ9 $G87=g87(-1)*(1+EGY*TVY/100)$ ;	PUBLIC CONSUMPTION
EQ10 $I87=IPR87+IG87+VE87$ ;	TOTAL INVESTMENT
EQ11 $IPR87=IT87-IG87$ ;	PRIVATE GROSS FIXED CAPITAL FORMATION
EQ11A $IT87=IT87(-1)*(1+TVIT/100)$ ;	TOTAL GROSS FIXED CAPITAL FORMATION

EQ12 $IG87=IG87(-1)*(1+TVIG/100);$	PUBLIC GROSS FIXED CAPITAL FORMATION
EQ13 $VE87=VEY*Y87;$	INVENTORY CHANGE
EQ14 $DI87=C87+G87+I87;$	INTERNAL EXPENDITURE
EQ14A $EX87=EXP87+EXAG87+EXMAN87+EXR87+EXSNF87;$	TOTAL EXPORTS
EQ15 $EXP87=EXPYP*VBPP;$	PETROLEUM EXPORTS
eq16 $EXR87=EXRYR*YR87;$	OTHER EXPORTS
EQ16B $EXAG87=EXRYAG*YAG87;$	AGRICULTURAL EXPORTS
EQ16C $EXMAN87=EXRYMAN*YMAN87;$	MANUFACTURING EXPORTS
eq16A $EXSNF87=EXSNFY*Y87;$	EXPORTS OF NON-FACTOR SERVICES
EQ17 $IM87=IM87(-1)*(1+EMY*TVY/100);$	TOTAL IMPORTS
EQ18 $C87=Y87-G87-IT87-EX87+IM87;$	PRIVATE CONSUMPTION

### III. NOMINAL PRICES (in trillions of Kwanzas reajustados)

EQ23 $EX=EXPT+EXR+EXSNF;$	TOTAL EXPORTS
EQ24 $EXPT=EXP87*PEXP/1000;$	PETROLEUM EXPORTS
EQ25 $EXR=EXR87*PEXR/1000;$	OTHER EXPORTS
EQ25B $EXAG=EXAG87*PEXAG/1000;$	AGRICULTURAL EXPORTS
EQ25C $EXMAN=EXMAN87*PEXMAN/1000;$	MANUFACTURING EXPORTS
EQ25A $EXSNF=EXSNF87*PEXR/1000;$	EXPORTS OF NON-FACTOR SERVICES
EQ26 $PEXP=PEXPd*ITCDOM;$	EXPORT PRICE INDEX
EQ27 $PEXR=PEXRD*ITCDOM;$	EXPORT PRICE INDEX - OTHER
EQ27B $PEXAG=PEXAGD*ITCDOM;$	EXPORT PRICE INDEX - AGRIC.
EQ27C $PEXMAN=PEXMAND*ITCDOM;$	EXP. PRICE INDEX - MANUFACTURING
EQ28 $IM=IM87*PM/1000;$	TOTAL IMPORTS
EQ29 $PM=PMD*ITCDOM;$	IMPORT PRICE INDEX
EQ30 $DLPM=LOG(PM/PM(-1));$	

EQ31 $CONS = C87 * PY / 1000$ ;	PRIVATE CONSUMPTION
EQ32 $G = G87 * PG$ ;	PUBLIC CONSUMPTION
EQ33 $IPR = IPR87 * PY / 1000$ ;	PRIVATE GROSS FIXED CAPITAL FORMATION
EQ34 $IG = IG87 * PY / 1000$ ;	PUBLIC INVESTMENT
EQ35 $VE = VE87 * PY / 1000$ ;	INVENTORY CHANGE
EQ36 $DI = CONS + G + IPR + IG + VE$ ;	INTERNAL EXPENDITURE
EQ37 $Y = DI + EX - IM$ ;	GDP AT MARKET PRICES
EQ38 $YN = Y + RF$ ;	GNP
EQ39 $YDN = YN + TRU$ ;	DISPOSABLE NATIONAL INCOME
EQ40 $RF = RFDOL * TCDOM / 1000$ ;	NET FACTOR INCOME
EQ41 $TRU = TRUDOL * TCDOM / 1000$ ;	NET UNILATERAL TRANSFERS
EQ42 $YDOL = Y * 1000 / TCDOM$ ;	GDP IN MILLIONS OF \$US
EQ42A $YDOLPC = YDOL * 1000 / POP$ ;	GDP/CAPITA

#### IV. PUBLIC FINANCE

EQ51 $RG = RCG + RKG$ ;	TOTAL RECEIPTS
EQ52a $RGNT = RGNT(-1) * (1 + TVRGNT / 100)$ ;	GRANTS
EQ52 $RCG = RGP + RGOC + TIL + RGNT$ ;	CURRENT RECEIPTS
EQ53 $RGP = EXPDOL * RPEXP * TCDOM / 10^3$ ;	PETROLEUM RECEIPTS
EQ53A $TIL = TIL87 * PY / 1000$ ;	INDIRECT TAXES
EQ54 $RGOC = ROYO * Y$ ;	DIRECT TAXES
EQ54A $RKG = RKG(-1) * (1 + TVRKG / 100) / 1000$ ;	INTEREST INCOME
EQ55 $DG = DPG + DBSG + TR + JURG + DKG$ ;	TOTAL EXPENDITURES
EQ55A $DPG = DPG(-1) * (1 + edpg * tvg / 100)$ ;	GOVERNMENT SALARIES
EQ55C $DBSG = G - DPG$ ;	GOVERNMENT PURCHASES OF GOODS & SERVICES
EQ56 $DKG = IG + TRKG$ ;	CAPITAL EXPENDITURES

EQ57 $TR = TRY * Y$ ;	CURRENT TRANSFERS
EQ58 $SGCO = RG - DG$ ;	GLOBAL FISCAL BALANCE
EQ59 $JURG = (TJG/100) * DIVE(-1) * TCDOM/10^3$ ;	INTEREST IN PUBLIC DEBT
EQ60 $FG = -SGCO$ ;	FINANCING REQUIREMENTS IN \$US
EQ61A $FGD = FG * 10^6 / TCDOM$ ;	FINANCING REQUIREMENTS IN \$US

## V. BALANCE OF PAYMENTS (in millions of \$US)

EQ62 $EXDOL = EXPDOL + EXAGDOL + EXMANDOL + EXRDOL + EXSNFDOL$ ;	TOTAL EXPORTS OF GOODS AND SERVICES
EQ63 $EXPDOL = BD * 365 * EXPYP * PPDOL / 10^6$ ;	PETROLEUM EXPORTS
EQ64 $EXRDOL = EXR87/.03 * PEXRD$ ;	OTHER EXPORTS
EQ64B $EXAGDOL = EXAG87/.03 * PEXAGD$ ;	AGRICULTURE EXPORTS
EQ64C $EXMANDOL = EXMAN87/.03 * PEXMAND$ ;	MANUFACTURED EXPORTS
EQ64A $EXSNFDOL = EXSNF87/.03 * PEXRD$ ;	EXPORTS OF NON-FACTOR SERVICES
EQ65 $IMDOL = IM87/.03 * PMD$ ;	TOTAL IMPORTS
EQ65A $TVDOL = 0.1 * IMDOL$ ;	IMPORTS OF TRANSPORT & SERVICES
EQ65B $IMDOL_{FOB} = IMT * IMDOL$ ;	MERCHANDISE IMPORTS( FOB)
EQ66 $BBSDOL = EXDOL - IMDOL$ ;	BALANCE IN GOODS AND SERVICES
EQ67 $BTCDOLE = BBSDOL + RFDOL + TRUDOL$ ;	BAL. ON CURRENT TRANSACTIONS
EQ68 $RFDOL = FX - FM$ ;	NET FACTOR INCOME
EQ69 $FM = JURDE + FMO$ ;	FACTOR PAYMENTS
EQ70 $JURDE = (TJDE/100) * DIVE(-1)$ ;	PAYMENT OF INTEREST ON EXTERNAL DEBT
EQ71 $FMO = TFMO * EXPDOL$ ;	OTHER FACTOR PAYMENTS
EQ72 $TRUDOL = TRUPRIV + TRUOF$ ;	CURRENT UNILATERAL TRANSFERS
EQ73 $TRUPRIV = TRUPRIV(-1) * (1 + TVTRUP/100)$ ;	PRIVATE TRANSFERS
EQ74 $TRUOF = TRUOF(-1) * (1 + TVTRUOF/100)$ ;	OFFICIAL TRANSFERS

EQ75 $NFE = -BTC DOL - DOK - IDE + AMDLP + VR$ ;	GROSS EXT. FINANCING NEEDS
EQ75A $FE = NFE - AMDLP$ ;	LIQUID EXTERNAL FINANCING NEEDS
EQ76 $IDE = IDE(-1) * (1 + TVIDE/100)$ ;	NET FOREIGN DIRECT INVESTMENT
EQ77 $AMDLP = TAMDLP * DIVE(-1)$ ;	LONG TERM DEBT AMORTIZATION
EQ78 $VR = 0.25 * (IMDOL - IMDOL(-1))$ ;	CHANGES IN RESERVES
EQ79 $DIVE = DIVE(-1) + NC - AMDLP - PD$ ;	EXTERNAL DEBT - END OF YEAR
EQ80 $DIVEM = (DIVE + DIVE(-1))/2$ ;	EXTERNAL MEDIUM TERM DEBT
EQ81 $JURCAP = ((TJE - TJDE)/100) * DIVE(-1)$ ;	CAPITALIZED INTEREST ON EXT. DEBT
EQ82 $OUT = IMDOL - IMDOLFOB - TVDOL$ ;	BAL. ON OTHER GOODS & SERVICES
EQ83 $DOK = DOK(-1) * (1 + TVDOK/100)$ ;	OFFICIAL GRANTS & CONGRESSIONAL CREDIT
EQ84 $FX = FX(-1) * (1 + TVFX/100)$ ;	FACTOR RECEIPTS FROM REST-OF-WORLD

## VI. MONETARY BLOCK

EQ87A $V1 = 1.5$ ;	VELOCITY OF MONEY CIRCULATION
EQ87B $M2M = Y/V1$ ;	MONEY DEMAND
EQ88A $ITCDOM = TCDOM/.03$ ;	EXCHANGE RATE INDEX ( $K_w/\$US$ , 1987 = 1)
EQ88B $TI = IPC * 100 - 100$ ;	INFLATION RATE

## Appendix B

### Computer Program - Angola Model

*Editor's Note: Since this is a literal printout of the Portuguese program instructions, we have not attempted to alter the formatting.*

? FORMULACAO DO MODELO COM TAXA DE VARIACAO DO INVESTIMENTO

?EXOGENA

? INVESTIMENTO PRIVADO CALCULADO POR DIFERENCA; INVESTIMENTO

?PUBLICO EXOGENO

options crt,signif=1;

freq a;

smpl 86 2025;

read(file='c:\ang\angmod\pagup.xls');

? EQUACOES DO MODELO MODANG 2

? 1. BLOCO DA OFERTA (BILIOES DE KUANZAS A PRECOS CONST DE 1987)

IDENT EQ1A VBPP=BD\*365\*516000/10^12; ? VBP DO SECTOR PETRO

IDENT EQ1B YP87=0.74\*VBPP; ? VAB DO SECTOR PETRO

IDENT EQ2 YR87=YR87(-1)\*(1+TVYR/100); ? PIBcf - REST SECTORES

IDENT EQ2A YAG87=YAG87(-1)\*(1+((pexag/pc)\*exp(1.5))/100); ?PIBcf - agricultura

IDENT EQ2B YMAN87=YMAN87(-1)\*(1+TVYMAN/100); ?PIBcf manufactura

IDENT EQ3 YCF87=YP87+YR87+YAG87+YMAN87; ? PIBcf - TOTAL

IDENT EQ4 TIL87=TILY87\*YCF87; ? Imp.Indir.-Subsídios

IDENT EQ5 Y87=YCF87+TIL87; ? PIBpm TOTAL

IDENT EQ5A YPOT87=Y87/TUC; ? PIB POTENCIAL

IDENT EQ6 POP=POP(-1)\*(1+TVPOP/100); ? Pop total

IDENT EQ7  $Y87PC=Y87/POP*1000$ ; ? PIB per capita( $10^3$  Ku.pr.87-ano)  
 FRML EQ7A  $TVY=(Y87/Y87(-1)-1)*100$ ; ? Taxa de variacao do PIBpm

## ? 2. BLOCO DA PROCURA FINAL E IMPORTAÇsES A PREÇOS DE 1987

? FRML EQ8  $C87=0.47*(YDN*1000/PY)-23.7*D92$ ; ? ConsumoPrivado  
 IDENT EQ9  $G87=g87(-1)*(1+EGY*TVY/100)$ ; ? Consumo Público  
 IDENT EQ10  $I87=IPR87+IG87+VE87$ ; ? INVESTIMENTO TOTAL  
 IDENT EQ11  $IPR87=IT87-IG87$ ; ? FBCF S.Privado  
 IDENT EQ11A  $IT87=IT87(-1)*(1+TVIT/100)$ ; ?FBCF TOTAL  
 ? IDENT EQ12  $IG87=IT87-IPR87$ ; ? FBCF S.Público  
 IDENT EQ12  $IG87=IG87(-1)*(1+TVIG/100)$ ; ? FBCF S.Público  
 IDENT EQ13  $VE87=VEY*Y87$ ; ? Var.Existências  
 IDENT EQ14  $DI87=C87+G87+I87$ ; ? DESPESA INTERNA  
 ? IDENT EQ14A  $EX87=EXP87+EXR87$ ; ?Export Totais  
 IDENT EQ14A  $EX87=EXP87+EXAG87+EXMAN87+EXR87+EXSNF87$ ; ? Export Totais  
 IDENT EQ15  $EXP87=EXPYP*VBPP$ ; ? Exp.Petroleo  
 ident eq16  $EXR87=EXRYR*YR87$ ; ? Outras Export  
 ident EQ16B  $EXAG87=EXRYAG*YAG87$ ; ? ag export  
 ident EQ16C  $EXMAN87=EXRYMAN*YMAN87$ ; ?man export  
 ident eq16A  $EXSNF87=EXSNFY*Y87$ ; ? Exports de serv nao factor87 p's  
 IDENT EQ17  $IM87=IM87(-1)*(1+EMY*TVY/100)$ ; ?Import Totais  
 FRML EQ18  $C87=Y87-G87-IT87-EX87+IM87$ ; ? Consumo privado

## ? 3. BLOCO NOMINAL E DE PREÇOS (EM TRILIsES DE KU.REAJ.)

IDENT EQ23  $EX=EXPT+EXR+EXSNF$ ; ?Export totais  
 IDENT EQ24  $EXPT=EXP87*PEXP/1000$ ; ?Exp.Petróleo



IDENT EQ25  $EXR=EXR87*PEXR/1000$ ; ?Outras Export

IDENT EQ25B  $EXAG=EXAG87*PEXAG/1000$ ; ?ag exports

IDENT EQ25C  $EXMAN=EXMAN87*PEXMAN/1000$ ; ?Man exports

IDENT EQ25A  $EXSNF=EXSNF87*PEXR/1000$ ; ?EXPORT DE Bens e SERV nao factor

IDENT EQ26  $PEXP=PEXPD*ITCDOM$ ; ?Indice de Prec(em ku.)das Exp.Pet

IDENT EQ27  $PEXR=PEXRD*ITCDOM$ ; ?Indice de Prec(em ku.) Outras Exp.

IDENT EQ27B  $PEXAG=PEXAGD*ITCDOM$ ; ?indice de prec(em ku) ag

IDENT EQ27C  $PEXMAN=PEXMAND*ITCDOM$ ; ?indice de prec(em ku) man

IDENT EQ28  $IM=IM87*PM/1000$ ; ?Import totais

IDENT EQ29  $PM=PMD*ITCDOM$ ; ?Indice de Preco das Import

ident EQ30  $DLPM=LOG(PM/PM(-1))$ ;

IDENT EQ31  $CONS=C87*PY/1000$ ; ? Consumo Privado

IDENT EQ32  $G=G87*PG$ ; ? Consumo Publico

IDENT EQ33  $IPR=IPR87*PY/1000$ ; ? FBCF S.Privado

IDENT EQ34  $IG=IG87*PY/1000$ ; ? Investimento Público

IDENT EQ35  $VE=VE87*PY/1000$ ; ? Var. Existencias

ident EQ36  $DI=CONS+G+IPR+IG+VE$ ; ? Despesa Interna

IDENT EQ37  $Y=DI+EX-IM$ ; ? PIBpm

IDENT EQ38  $YN=Y+RF$ ; ? PNB

IDENT EQ39  $YDN=YN+TRU$ ; ? Rendim.Disp.Nac.

IDENT EQ40  $RF=RFDOL*TCDOM/1000$ ; ? Saldo Rend.Factores prov.R.Mundo

ident EQ41  $TRU=TRUDOL*TCDOM/1000$ ; ? Saldo Transf.Unil.Corr.c/R.Mundo

IDENT EQ42  $YDOL=Y*1000/TCDOM$ ; ? PIB em milhoes de dolares

IDENT EQ42A  $YDOLPC=YDOL*1000/POP$ ; ? PIB per capita em \$US

? FRML EQ44  $PC=PC(-1)*exp(.773*DLPM+.232*DLPM(-1))$ ;

?Defl.Cons.Priv.

? FRML EQ45  $PG = PG(-1) * \exp(.828 * DLPM + .1334 * dlpm(-1))$ ;  
 ?Defl.Cons.Pub.

? frml EQ46  $PIPR = PIPR(-1) * PMBK / PMBK(-1)$ ;  
 ?Defl.FBCF S.Priv.

? FRML EQ47  
 ? $PIG = PIG(-1) * \exp(.7654 * DLPMBK + .2032 * DLPMBK(-1))$ ; ?Defl.Inv.Publ.

? frml EQ48  $PMBK = PMBKD * ITCDOM$ ; ?Defl.Imp.B.Capital

? FRML EQ49  $DLPMBK = \log(PMBK / PMBK(-1))$ ;

? frml EQ50  $PVE = PVE(-1) * PY / PY(-1)$ ; ? Defl.V.E.

#### ?4. BLOCO DA FINANcAS PuBLICAS

IDENT EQ51  $RG = RCG + RKG$ ; ? Receitas totais do SPA

? IDENT eq52  $RCG = RGP + RGOC + TIL$ ; ? Receitas correntes

IDENT EQ52a  $RGNT = RGNT(-1) * (1 + TVRGNT / 100)$ ; ? Receitas nao tributarias

IDENT EQ52  $RCG = RGP + RGOC + TIL + RGNT$ ; ? Receitas correntes

IDENT EQ53  $RGP = EXPDOL * RPEXP * TCDOM / 10^3$ ; ? REC FISCAIS PET

FRML EQ53A  $TIL = TIL87 * PY / 1000$ ; ?Impostos Indirectos

FRML EQ54  $RGOC = ROYO * Y$ ; ? Impostos Directos

FRML EQ54A  $RKG = RKG(-1) * (1 + TVRKG / 100) / 1000$ ; ? Receitas fiscais de capital

? IDENT EQ55  $DG = G + TR + JURG + DKG$ ; ? Despesas Totais do SPA

IDENT EQ55  $DG = DPG + DBSG + TR + JURG + DKG$ ; ? Despesas Totais do SPA

IDENT EQ55A  $DPG = DPG(-1) * (1 + edpg * tvg / 100)$ ; ? Despesas Totais do SPA

? IDENT EQ55B  $DPG87 = (DPG / PG) * 1000$ ; ? Despesas Totais do SPA

IDENT EQ55C  $DBSG = G - DPG$ ; ? Despesas Totais do SPA

? IDENT EQ55D DBSG87=G87-DPG87; ? Despesas Totais do SPA  
 IDENT EQ56 DKG=IG+TRKG; ? Despesas de capital;  
 frml eq57 TR=TRY\*Y; ? Tranf.correntes  
 IDENT EQ58 SGCO=RG-DG; ? Saldo global b.compromissos  
 FRML EQ59 JURG=(TJG/100)\*DIVE(-1)\*TCDOM/10^3; ? Juros da Divida Publica  
 IDENT EQ60 FG=-SGCO; ? Financiamento do def.SPA  
 IDENT EQ61A FGD=FG\*10^6/TCDOM; ? Fin. liq. do def.SPA em \$US

#### ? 5. BLOCO DA BALANÇA DE PAGAMENTOS (em Milhoes de dolares)

? IDENT EQ62 EXDOL=EXPDOL+EXRDOL;  
 ?Exports Totais de Bens e Servicos  
 IDENT EQ62  
 EXDOL=EXPDOL+EXAGDOL+EXMANDOL+EXRDOL+EXSNFDOL;?Exports Tot Bens e  
 Servs  
 IDENT EQ63 EXPDOL=BD\*365\*EXPYP\*PPDOL/10^6; ?Exp.Petro  
 IDENT EQ64 EXRDOL=EXR87/.03\*PEXRD; ?Outras exports  
 IDENT EQ64B EXAGDOL=EXAG87/.03\*PEXAGD; ?ag exports  
 IDENT EQ64C EXMANDOL=EXMAN87/.03\*PEXMAND; ? man exports  
 IDENT EQ64A EXSNFDOL=EXSNF87/.03\*PEXRD; ?Exports de servs nao factor USD  
 FRML EQ65 IMDOL=IM87/.03\*PMD; ?Imports Totais de bens e servs  
 IDENT EQ65A TVDOL=0.1\*IMDOL; ?Transports e servs  
 FRML EQ65B IMDOLFOB=IMT\*IMDOL; ?Imports de Mercadorias FOB  
 IDENT EQ66 BBSDOL=EXDOL-IMDOL; ?Bal.Bens e Servs  
 IDENT EQ67 BTCDOL=BBSDOL+RFDOL+TRUDOL; ? BTC  
 IDENT EQ68 RFDOL=FX-FM; ?Saldo dos Rend.Factores  
 IDENT EQ69 FM=JURDE+FMO; ?Saida de Rend.Factores

ident eq70  $JURDE = (TJDE/100) * DIVE(-1)$ ; ?Pag.Juros da div. externa

IDENT EQ71  $FMO = TFMO * EXPDOL$ ; ?Outros Rend.Fact.pagos

IDENT EQ72  $TRUDOL = TRUPRIV + TRUOF$ ; ?Transf.Corr.Unilaterais

ident eq73  $TRUPRIV = TRUPRIV(-1) * (1 + TVTRUP/100)$ ; ?TRANSF.PRIVADAS

IDENT EQ74  $TRUOF = TRUOF(-1) * (1 + TVTRUOF/100)$ ; ?Tranf.oficiais

ident eq75  $NFE = -BTCOL - DOK - IDE + AMDLP + VR$ ; ?Nec.Fin.Externo Bruto

IDENT EQ75A  $FE = NFE - AMDLP$ ; ?Nec.Fin.Externo líquido

IDENT EQ76  $IDE = IDE(-1) * (1 + TVIDE/100)$ ; ?Investim.dir.estrangeiro(saldo)

ident EQ77  $AMDLP = TAMDLP * DIVE(-1)$ ; ?Amortiz.Div.Longo-Prazo

IDENT EQ78  $VR = 0.25 * (IMDOL - IMDOL(-1))$ ; ?Var de reservas

? IDENT EQ79

? $DIVE = DIVE(-1) + NC - AMDLP - JURDE + JURCAP$ ; ?Div.Externa fim do ano

IDENT EQ79  $DIVE = DIVE(-1) + NC - AMDLP - PD$ ; ?Div.Externa fim do ano

IDENT EQ80  $DIVEM = (DIVE + DIVE(-1))/2$ ; ?Div.Externa media

ident eq81  $JURCAP = ((TJE - TJDE)/100) * DIVE(-1)$ ; ?Juros div.ext.capitalizados

? FRML eq82  $OUT = OUT(-1) * (1 + TVOUT/100)$ ; ?Outros da Bal de bens e servs

FRML eq82  $OUT = IMDOL - IMDOLFOB - TVDOL$ ; ?Outros da Bal de bens e servs

FRML eq83  $DOK = DOK(-1) * (1 + TVDOK/100)$ ; ?Doacoes Oficiais e creds concessionais

FRML EQ84  $FX = FX(-1) * (1 + TVFX/100)$ ; ?Recebimentos de factores do RM

## ? 6.BLOCO MONETARIO

IDENT EQ87A  $V1 = 1.5$ ; ?VELOC.CIRC.MOEDA

IDENT EQ87B  $M2M = Y/V1$ ; ?PROCURA DE MOEDA

IDENT EQ88A  $ITCDOM = TCDOM/.03$ ; ?IND DA TAXA CAMBIO KU/ \$US(87=1)

IDENT EQ88B  $TI = IPC * 100 - 100$ ; ?TAXA DE INFLAcao

LIST ENDOG VBPP YP87 YR87 YAG87 YMAN87 YCF87 TIL87 Y87 YPOT87 POP Y87PC  
TVY

C87 G87 I87 IG87 IPR87 IT87 VE87 DI87 EX87 EXP87 EXR87 EXAG87 EXMAN87 IM87  
EX EXPT EXR EXAG EXMAN PEXP PEXR PEXAG PEXMAN IM PM DLPM

CONS G IPR IG VE DI Y YN YDN RF TRU YDOL YDOLPC

RG RGNT RCG RGP TIL RGOC RKG DG DPG DBSG DKG TR SGCO JURG FG FGD

EXDOL EXPDOL EXAGDOL EXMANDOL

EXRDOL IMDOL BBSDOL BTCDOL RFDOL FM JURDE

FMO TRUDOL TRUPRIV TRUOF NFE FE IDE AMDLP VR DIVE DIVEM

JURCAP OUT DOK FX V1 M2M ITCDOM TI TVDOL IMDOLFOB EXSNFDOL EXSNF87  
EXSNF;

LIST MODEQ EQ1A EQ1B EQ2 EQ2A EQ2B EQ3 EQ4 EQ5 EQ5A EQ6 EQ7 EQ7A EQ9  
EQ10 EQ11

EQ11A

EQ12 EQ13

EQ14 EQ14A EQ15 EQ16 EQ16B EQ16C EQ17 EQ18 EQ23 EQ24 EQ25 EQ25B EQ25C  
EQ26

EQ27 EQ27B EQ27C EQ28 EQ29 EQ30 EQ31 EQ32 EQ33 EQ34 EQ35 EQ36 EQ37 EQ38  
EQ39 EQ40

EQ41 EQ42 EQ42A EQ51 EQ52A EQ52 EQ53 EQ53A EQ54 EQ54A

EQ55 EQ55A EQ55C EQ56 EQ57 EQ58 EQ59 EQ60 EQ61A EQ62 EQ63 EQ64 EQ64B  
EQ64C EQ65 EQ66

EQ67

EQ68 EQ69 EQ70 EQ71 EQ72 EQ73 EQ74 EQ75 EQ75A EQ76 EQ77 EQ78 EQ79 EQ80  
EQ81

EQ82 EQ83 EQ84 EQ87A EQ87B EQ88A EQ88B EQ65A EQ65B EQ64A EQ16A EQ25A;

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MODEL MODEQ ENDOG MODANG2;
SMPL 96 2025;
SOLVE (TAG=S,DYNAM) MODANG2;
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expts exrs exr87s exrdols exags exag87s exagdols exmans exman87s exmandols fes fgs
fgds fms fmos gs g87s i87s ides igs
ig87s ims im87s imdols iprs ipr87s it87s itcdoms jurcaps jurdes jurgs m2ms
nfes pexps pexrs pexags pexmans pms pops rgs rfs rfdols
rgs rgocs rgps sgcoss til87s trs trus trudols truofs truprivs tvys vls ves
ve87s vrs ys y87s y87pcs ycf87s ydns ydols ydolpcs yns yp87s ypot87s yr87s yag87s yman87s
ex87s tils rkgs outs doks fxs rgnts dpgs dbgs tis tvdols imdolfobs nc pd exsnfdols exsnf87s
exsnfs tvyag;

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